

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) EP 0 820 132 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
08.04.1998 Bulletin 1998/15

(51) Int Cl.⁶: H01S 3/0975, H01S 3/225,
H01S 3/08

(43) Date of publication A2:
21.01.1998 Bulletin 1998/04

(21) Application number: 97305404.2

(22) Date of filing: 18.07.1997

(84) Designated Contracting States:
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE

(30) Priority: 19.07.1996 JP 208817/96
22.07.1996 JP 212059/96
12.08.1996 JP 212923/96
04.10.1996 JP 264912/96
17.01.1997 JP 6441/97
15.04.1997 JP 97648/97

(71) Applicants:
• CANON KABUSHIKI KAISHA
Tokyo (JP)
• Ohmi, Tadahiro
Sendai-shi, Miyagi-ken (JP)

(72) Inventors:
• Ohmi, Tadahiro
Sendai-shi, Miyagi-ken (JP)
• Tanaka, Nobuyoshi, c/o Canon Kabushiki Kaisha
Ohta-ku, Tokyo (JP)
• Hirayama, Masaki
Sendai-shi, Miyagi-ken (JP)

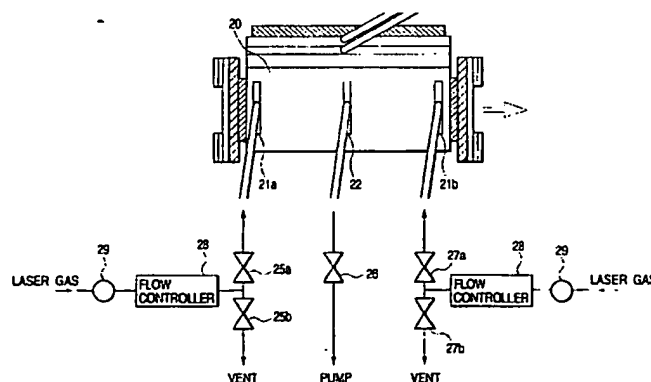
(74) Representative:
Beresford, Keith Denis Lewis et al
BERESFORD & Co.
2-5 Warwick Court
High Holborn
London WC1R 5DJ (GB)

(54) Excimer laser oscillation apparatus and method, excimer laser exposure apparatus, and laser tube

(57) This invention relates to an excimer laser oscillation apparatus which has a laser chamber (20) which stores a laser gas containing a gas mixture of at least one inert gas selected from the group consisting of Kr, Ar, and Ne, and F₂ gas, and in which an inner surface thereof has a reflection-free surface (3) with respect to light of a desired wavelength of 248 nm, 193 nm, or 157 nm, and the uppermost surface of the inner surface con-

sists of a fluoride, an optical resonator which is made up of a pair of reflection mirrors (5,6) arranged to sandwich the laser chamber (20) therebetween, and in which the reflectance of the reflection mirror (6) on the output side is 90% or more and microwave introduction means (300,303,302), arranged on the laser chamber (20), for continuously exciting the laser gas in the laser chamber (20).

FIG. 1





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 30 5404

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (In Cl.6)
A	WO 90 13160 A (SIEMENS) * abstract; figures 1-10 * ---	1,28,40, 44,51-53	H01S3/0975 H01S3/225 H01S3/08
A	WO 88 07272 A (DEUTSCHE FORSCHUNGS UND VERSUCHSANSTALT FÜR LUFT UND RAUMFAHRT) * abstract; claim 32; figures 1-24 * ---	1,28,40, 44,51-53	
A	EP 0 472 727 A (K.K.KOMATSU SEISAKUSHO) * abstract; figures 1-11 * * column 8 * ---	1,28,40, 44,51-53 54-57	
Y	US 3 404 349 A (W.W.RIGROD) * the whole document * ---	54-57	
Y	GB 1 128 162 A (G.&E.BRADLEY) * page 2; figure 1 * ---	54,55,57	
Y	US 3 402 364 A (H.DE LANG) * the whole document * -----	54,55	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H01S
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 February 1998	Examiner Malic, K
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

EPO FORM 1503 03.82 (POMC01)



European Patent
Office

Application Number
EP 97 30 5404

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

**SEE SHEET B
(In case of Lack of Unity)**

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:



European Patent
Office

**LACK OF UNITY OF INVENTION
SHEET B**

Application Number
EP 97 30 5404

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1-53

EXCIMER LASER EXCITED BY MICROWAVES

2. Claims: 54-58

EXCIMER LASER RESONATOR